

NJDOT Bureau of Research
QUARTERLY PROGRESS REPORT

Project Title:	Compatibility of Highway Railroad Crossing Gates with Overhead Catenary System High Voltage Power for Trains		
RFP NUMBER: 2004-04	NJDOT RESEARCH PROJECT MANAGER: Karl Brodtman		
TASK ORDER NUMBER::9	PRINCIPAL INVESTIGATOR: William Riddell		
Project Starting Date: January 1, 2005 Original Project Ending Date: 12/31/06 Modified Completion Date:	Period Starting Date: January 1, 2005 Period Ending Date: March 31, 2005		

Task	% of Total	% of Task this quarter	% of Task to date	% of Total Complete
1. Preliminary Literature Search	5%	100%	100%	5%
2. Detailed Work Plan	5%	50%	50%	2.5%
3. Comprehensive Literature Search	15%	33%	33%	5%
4. Review and Eval. Of Crossings	25%	10%	10%	2.5%
5. Propose Solutions	25.0%			
6. Develop of Verification Plan	12.5%			
7. Verification of Solutions	25.0%			
Final Report	12.5%			
TOTAL	100%			15%

Project Objectives:

1. Determine the extent of the problems with crossing gates contacting the overhead catenary system (OCS) that supplies 25,000 volts, 60 Hz propulsion power to the trains. Included in the problem evaluations will be all of the consequences of the high voltage power supply contacting the crossing gates.
2. Review previous unsuccessful attempts at solutions and the reasons why these solutions did not succeed. Success is defined as no failures.
3. Propose new solutions in all areas such as mechanical (alternative breakaway schemes), electro-mechanical (gate construction), electronic (surge protection, isolation, etc.); high voltage laboratory and field testing of all proposed solutions, etc. Include combinations of solutions if warranted.
4. Provide for verification of the construct ability of the solutions through test prototypes, the maintainability, the reliability, for the compliance with legal and regulatory requirements.
5. Demonstrate that the solutions are commercially viable and include all requirements for commercial implementation.

Project Abstract:

NJ TRANSIT has more than 400 highway railroad crossings equipped with automatic gates. On occasion, through collision damage, wind, or other causes, gates come in contact with high voltage power lines, causing severe damage and hazardous conditions, especially in
As of 2/06/2004

areas where rail lines have 25 kV overhead traction power lines. NJ TRANSIT needs to have a comprehensive evaluation performed on various conceptual solutions to this problem. As a minimum, the project must: Research the extent of the problem, Search literature and manufacturers for potential solutions, Evaluate alternative solutions, and Recommend a commercially viable solution including all requirements for implementation.

1. Progress this quarter by task:

Task 1. Preliminary Literature Search – Hardcopy completed.

Task 2. Detailed Work Plan – The group has formulated an approach. Once this is discussed with NJ DOT, the detailed work plan will be written formally.

Task 3. Comprehensive Literature Search. – Some additional details have been included since the preliminary literature search was written. Phil Olekszyk (World Wide Rail) was contacted regarding consulting. Mr. Olekszyk was recommended by Paul Schneider of NJ Transit. It appears that Mr. Olekszyk's background will be excellent for grade crossing signal equipment, and he was confident that he can find a partner with expertise in Overhead Catenary Systems.

Task 4. Review and Evaluation of Crossings

a) Review of Grade Crossings. – A database containing pertinent crossing information has been assembled. Satellite images of all crossings have been obtained and organized. Two sidewalk visits have been performed (no incursions on NJ Transit property during these visits). A strategy for surveying sites quickly and with little to no fouling of track is being developed on campus. Rail Safety Training Certification was obtained by team.

b) No Progress

c) Development of Model for Phase-to-Ground Faults. – Preliminary model for faults is being developed. Properties for pertinent materials have been obtained.

2. Proposed activities for next quarter by task

Task 1. Meeting to discuss preliminary literature review.

Task 2. Development of Detailed Work Plan. Discuss and Finalize Work Plan with NJ DOT.

Task 3. Comprehensive Literature Search will be worked on. Finalize a contract with World Wide Rail to assist with final literature review and future efforts.

Task 4. Review and Evaluation of Crossings

Continued overview evaluation of sites, and begin to develop detailed evaluation of problem sites. Continued progress on modeling,

3. List of deliverables provided in this quarter by task (product date)

Hard Copy of Deliverable 1. (March Meeting scheduled for April.

4. Progress on Implementation and Training Activities

As of 2/06/2004

None

5. Problems/Proposed Solutions

None

Total Project Budget: NJDOT Year 1 -\$ 91,459, Year 2 -\$ 165,328	\$ 91,459
Modified Contract Amount:	
Total Project Expenditure to date	
% of Total Project Budget Expended	%

NJDOT Bureau of Research
QUARTERLY PROGRESS REPORT

Project Title:	Safety Audit of Fatalities and Injuries Involving Guide Rail		
RFP NUMBER:	2003-34	NJDOT RESEARCH PROJECT MANAGER: Nazhat Aboobaker	
TASK ORDER NUMBER:	99ROW1-8	PRINCIPAL INVESTIGATOR: John C. Chen Rowan University	
Project Starting Date:	1/1/2004	Period Starting Date:	January 1, 2005
Original Project Ending Date:	12/31/2005	Period Ending Date:	March 31, 2005
Modified Completion Date:			

Task	% of Total	% of Task this quarter	% of Task to date	% of Total Complete
Literature Search	5		100	5
1. Comprehensive Literature Survey	5		100	5
2. Locate and Assemble Documented information on Fatal and Injurious Accidents involving Guide Rail	20	15	90	18
3. Determine Unsolved Guide Rail Problems	10			
4. Evaluate Fatal and Serious-Injury Guide Rail Accident Sites	50	20	70	35
Final Report	10			
TOTAL	100%			63

SAFETY AUDIT OF FATALITIES AND INJURIES INVOLVING GUIDE RAIL

NJDOT Research Task Order 8 Quarterly Progress Report – March 2005

Project Objectives:

The goal of this study is to evaluate fatal and injury-causing guide rail accidents in New Jersey. The specific objectives are to:

- 1) Locate and assemble documented information on fatal and injurious guide rail impacts.
- 2) Identify all ongoing research involving guide rail accidents.
- 3) Determine unsolved guide rail collision problems.
- 4) Evaluate fatal and injury-causing impacts with guide rails in New Jersey, and recommend actions for improvements in guide rail safety performance.

Project Abstract:

Guide Rails are designed to protect vehicle occupants from trees, poles, side slopes and other hazards they may encounter in run-off road accidents. Unfortunately, a guide rail is not always a forgiving object to strike. In 2001, there were 1143 fatal crashes and 34,000 injurious crashes into guide rails in the United States.

The reasons why guide rail impacts sometimes lead to fatality or injury are complex and not completely understood. Guide rail problems include, but are not limited to, many of the following issues (1) improper installation, (2) impacts with end treatments, (3) unfavorable roadside conditions, e.g. soft soil or excessive side slope (4) side impact, (5) improper redirection after a crash, and (6) wheel snagging. Guide rail performance can be affected not only by barrier design, but also by vehicle design. Poor guide rail performance may result from (1) light trucks overturning on impact with guide rail, (2) cars “submarining” under the rail, (3) airbag-induced injuries, and (4) incompatibility with heavy trucks.

The goal of this study is to evaluate fatal and injury-causing guide rail accidents in New Jersey. The approach will be to investigate this issue through the combination of a comprehensive literature survey, interviews with roadside safety researchers on ongoing research, examination of U.S. and state accident databases, and, most importantly, site investigation of guide rail accidents which result in either fatal or serious occupant injury. The proposed research program will evaluate all fatal guide rail accidents which occur in New Jersey during the contract period, and will also examine a focused subset of guide rail accidents which result in serious, but non-fatal, injury. Implementation of the findings from this project should substantially benefit the NJDOT by providing an improved understanding of those installation or design factors which lead to guide rail related fatalities and injuries.

1. Progress this quarter by task:

- Meeting with NJDOT. A meeting for the project was held on December 17, 2004 at NJDOT headquarters. The PI and the Project Panel discussed the findings from the EDR guide rail investigation, results of accident investigations to date, as well as other potential guide rail crash notification avenues.
- Task 2 – Locate and Assemble Documented Information on Fatal and Injurious Accidents Involving Guide Rail.
 - Event Data Recorders (EDRs) are a new technology that can provide a comprehensive snapshot of an entire crash event. The research team has explored the use of EDR data to study guide rail performance in real-world collisions. Preliminary findings based on the available data were presented at the December 17th meeting. A report has been prepared for review by the project panel.
 - The research team is analyzing fatal and injurious New Jersey guide rail accidents based upon New Jersey highway accident statistics. Preliminary results were presented at the October 12th meeting. Additional results will be presented based on an analysis of the available police reports involving serious and fatal NJ guide rail collisions in 2003. A report documenting the findings to date is currently being prepared.
 - The research team is currently analyzing the available national data to determine national experience with fatal and injurious guide rail collisions. Also, the research team is exploring the use of specialized roadside databases such as the Longitudinal Barrier Special Study (LBSS) and the Highway Safety Information System (HSIS) to further characterize injury in guide rail collisions. Preliminary results will be presented.
- Task 4 - Evaluate Fatal and Serious-Injury Guide Rail Accident Sites.
 - The research team has investigated guide rail performance in eight crashes to date. Most recently, the team investigated a fatal end terminal impact on I-295 and a roadside guide rail impact on County Route 551 in Pedricktown. A copy of the accident investigation reports are being prepared for review by the Project Panel.
 - The research team has continued to disseminate information to towing companies in the surrounding area. Approximately 30 towing companies have been contacted so far, including areas from the Delaware Memorial Bridge to the Trenton area. To date, a total of two accident investigations have been a result of notification via a towing company.

2. Proposed activities for next quarter by task

- Continue Locating and Assembling Documented Information on Fatal and Injurious Accidents Involving Guide Rail
- Continue Investigation of guide rail collision sites

3. List of deliverables provided in this quarter by task

- Summary of Task 2.4: “Event Data Recorder Data in Guide Rail Accidents”

4. Progress on Implementation and Training Activities

- None Scheduled

5. Problems/Proposed Solutions

- None Scheduled

Total Project Budget	122,720
Modified Contract Amount:	
Total Project Expenditure to date	96,273.54
% of Total Project Budget Expended	78.4%